Growth Intercept Models and Tables for British Columbia — Interior Species

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GROWTH INTERCEPT MODELS AND TABLES FOR BRITISH COLUMBIA — INTERIOR SPECIES

Gordon D. Nigh

Forest Productivity Section
B.C. Ministry of Forests, Research Branch
P.O. Box 9519, Stn. Prov. Govt., Victoria, B.C. V8W 9C2

This field guide insert presents the growth intercept models and tables available for use in the interior of British Columbia. Included are growth intercept models and tables for:

Species	Code	Reference	Revised
Lodgepole Pine	Pli	Nigh (1997)	Oct. 1999
Interior Spruce	Sx	Nigh (1999)	Oct. 1999
Douglas-fir	Fdi	Nigh (1997)	Oct. 1999
Western Hemlock	Hw	Nigh (1997)	Oct. 1999
Subalpine Fir	Bl	Thrower (1997)	Oct. 1999
Western Redcedar	Cw	Nigh (1999)	Oct. 1999
Western Larch	Lw	Nigh et al. (1999)	Oct. 1999

The Options section notes any options and alternative models or model formulations, and provides references that are available from the above address.

The tables are designed for rough estimation of site index in the field. The formulation or the appropriate publication should be consulted for accurate site index determination.

The arbitrary range of site index in the tables is 5–40 m. The tables are in a common format for consistency among species and do not necessarily represent the range of site indices found in the model development data. Site index is based on top height and a reference age of 50 years (breast height) for all species. Estimates of growth intercept and site index that are beyond the range of the data used in the analyses (given in the Notes section for each species) should be interpreted with caution.

The tables presented in this handbook do not have sufficient resolution, particularly at young ages, to be used in silviculture surveys. Silviculture surveyors, and others who need to estimate site index during a silviculture survey or a reconnaissance, should consult the appropriate field guide for silviculture surveys (B.C. Min. For. 1995. Growth intercept method for silviculture surveys. Forest Practices Br., Victoria, B.C.). As well, information about the application of the models can be obtained from the source reports.

Growth intercept models and tables will be refined and updated as new information becomes available. A revised reference list will be issued with each addition or revision. Write to the above address for updates.

Interior Lodgepole Pine

Source:

Nigh, G.D. 1997. Revised growth intercept models for lodgepole pine: comparing northern and southern models. B.C. Min. For., Res. Br., Victoria, B.C. Exten. Note 11.

Formulation:

Age	Model	Age	Model
1	$SI = 1.3 + 3.23\ GI_{1}^{0.477}$	26	$SI = 1.3 + 0.959\ GI_{26}^{0.782}$
2	$SI = 1.3 + 2.73\ GI_{2}^{0.508}$	27	$SI = 1.3 + 0.917\ GI_{27}^{0.795}$
3	$SI = 1.3 + 2.67\ GI_{3}^{0.510}$	28	$SI = 1.3 + 0.871\ GI_{28}^{0.810}$
4	$SI = 1.3 + 2.47\ GI_{4}^{0.527}$	29	$SI = 1.3 + 0.836\ GI_{29}^{0.823}$
5	$SI = 1.3 + 2.35\ GI_{5}^{0.538}$	30	$SI = 1.3 + 0.800\ GI_{30}^{0.835}$
6	$SI = 1.3 + 2.37\ GI_{6}^{0.534}$	31	$SI = 1.3 + 0.780\ GI_{31}^{0.844}$
7	$SI = 1.3 + 2.29\ GI_{7}^{0.542}$	32	$SI = 1.3 + 0.756\ GI_{32}^{0.854}$
8	$SI = 1.3 + 2.13\ GI_{8}^{0.560}$	33	$SI = 1.3 + 0.724\ GI_{33}^{0.867}$
9	$SI = 1.3 + 2.02\ GI_{9}^{0.574}$	34	$SI = 1.3 + 0.702\ GI_{34}^{0.876}$
10	$SI = 1.3 + 1.92\ GI_{10}^{0.587}$	35	$SI = 1.3 + 0.686\ GI_{35}^{0.884}$
11	$SI = 1.3 + 1.80\ GI_{11}^{0.604}$	36	$SI = 1.3 + 0.667\ GI_{36}^{0.893}$
12	$SI = 1.3 + 1.72\ GI_{12}^{0.615}$	37	$SI = 1.3 + 0.647\ GI_{37}^{0.903}$
13	$SI = 1.3 + 1.66\ GI_{13}^{0.625}$	38	$SI = 1.3 + 0.629\ GI_{38}^{0.913}$
14	$SI = 1.3 + 1.58\ GI_{14}^{0.639}$	39	$SI = 1.3 + 0.615\ GI_{39}^{0.920}$
15	$SI = 1.3 + 1.53\ GI_{15}^{0.648}$	40	$SI = 1.3 + 0.601\ GI_{40}^{0.928}$
16	$SI = 1.3 + 1.47\ GI_{16}^{0.660}$	41	$SI = 1.3 + 0.585\ GI_{41}^{0.937}$
17	$SI = 1.3 + 1.39\ GI_{17}^{0.674}$	42	$SI = 1.3 + 0.573\ GI_{42}^{0.945}$
18	$SI = 1.3 + 1.33\ GI_{18}^{0.688}$	43	$SI = 1.3 + 0.559\ GI_{43}^{0.953}$
19	$SI = 1.3 + 1.27\ GI_{19}^{0.700}$	44	$SI = 1.3 + 0.546\ GI_{44}^{0.962}$
20	$SI = 1.3 + 1.22\ GI_{20}^{0.712}$	45	$SI = 1.3 + 0.535\ GI_{45}^{0.969}$
21	$SI = 1.3 + 1.17\ GI_{21}^{0.724}$	46	$SI = 1.3 + 0.524\ GI_{46}^{0.977}$
22	$SI = 1.3 + 1.12\ GI_{22}^{0.735}$	47	$SI = 1.3 + 0.515\ GI_{47}^{0.983}$
23	$SI = 1.3 + 1.08\ GI_{23}^{0.747}$	48	$SI = 1.3 + 0.507\ GI_{48}^{0.990}$
24	$SI = 1.3 + 1.04\ GI_{24}^{0.757}$	49	$SI = 1.3 + 0.499\ GI_{49}^{0.996}$
25	$SI = 1.3 + 1.00\ GI_{25}^{0.769}$	50	$SI = 1.3 + 0.492\ GI_{50}^{1.00}$

where: SI = estimated site index (m at breast height age 50), and
GI = growth intercept (cm/year).

Site Index Table for Interior Lodgepole Pine

bh ring count	Tree Height (m)													
	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	Site Index (m)													
2	21	31	39	–	–	–	–	–	–	–	–	–	–	–
4	13	20	26	30	34	38	–	–	–	–	–	–	–	–
6	11	16	20	24	27	30	32	34	37	39	–	–	–	–
8	9	14	17	20	23	25	28	30	32	34	36	37	39	–
10	8	12	15	18	20	23	25	27	29	30	32	34	35	37
12	7	10	13	16	18	20	22	24	26	28	29	31	32	34
14	6	9	12	14	17	19	20	22	24	26	27	29	30	32
16	5	8	11	13	15	17	19	21	22	24	25	27	28	30
18	5	8	10	12	14	16	18	19	21	22	24	25	27	28
20	–	7	9	11	13	15	16	18	19	21	22	24	25	26
22	–	6	9	10	12	14	15	17	18	20	21	23	24	25
24	–	6	8	10	11	13	14	16	17	19	20	21	23	24
26	–	6	7	9	11	12	14	15	16	18	19	20	22	23
28	–	5	7	8	10	11	13	14	16	17	18	19	21	22
30	–	5	6	8	9	11	12	14	15	16	17	19	20	21
32	–	–	6	7	9	10	12	13	14	15	17	18	19	20
34	–	–	6	7	8	10	11	12	13	15	16	17	18	19
36	–	–	5	7	8	9	11	12	13	14	15	16	18	19
38	–	–	5	6	8	9	10	11	12	14	15	16	17	18
40	–	–	5	6	7	8	10	11	12	13	14	15	16	17
42	–	–	5	6	7	8	9	10	11	13	14	15	16	17
44	–	–	–	6	7	8	9	10	11	12	13	14	15	16
46	–	–	–	5	6	7	9	10	11	12	13	14	15	16
48	–	–	–	5	6	7	8	9	10	11	12	13	14	15
50	–	–	–	5	6	7	8	9	10	11	12	13	14	15

bh - breast height = 1.3 m

(continued)

Tree Height (m)														bh ring
16	17	18	19	20	21	22	23	24	25	26	27	28	29	count
Site Index (m)														
–	–	–	–	–	–	–	–	–	–	–	–	–	–	2
–	–	–	–	–	–	–	–	–	–	–	–	–	–	4
–	–	–	–	–	–	–	–	–	–	–	–	–	–	6
–	–	–	–	–	–	–	–	–	–	–	–	–	–	8
38	40	–	–	–	–	–	–	–	–	–	–	–	–	10
35	37	38	40	–	–	–	–	–	–	–	–	–	–	12
33	34	36	37	38	40	–	–	–	–	–	–	–	–	14
31	32	34	35	36	37	38	40	–	–	–	–	–	–	16
29	31	32	33	34	36	37	38	39	40	–	–	–	–	18
28	29	30	31	33	34	35	36	37	38	40	–	–	–	20
26	28	29	30	31	32	34	35	36	37	38	39	40	–	22
25	26	28	29	30	31	32	33	34	36	37	38	39	40	24
24	25	27	28	29	30	31	32	33	34	36	37	38	39	26
23	24	26	27	28	29	30	31	32	33	35	36	37	38	28
22	23	25	26	27	28	29	30	31	33	34	35	36	37	30
21	23	24	25	26	27	28	29	30	32	33	34	35	36	32
21	22	23	24	25	26	27	28	30	31	32	33	34	35	34
20	21	22	23	24	25	27	28	29	30	31	32	33	34	36
19	20	21	22	24	25	26	27	28	29	30	31	32	33	38
19	20	21	22	23	24	25	26	27	28	29	30	31	32	40
18	19	20	21	22	23	24	25	26	27	29	30	31	32	42
17	18	20	21	22	23	24	25	26	27	28	29	30	31	44
17	18	19	20	21	22	23	24	25	26	27	28	29	30	46
16	17	18	20	21	22	23	24	25	26	27	28	29	30	48
16	17	18	19	20	21	22	23	24	25	26	27	28	29	50

Options:

1. Conventional, fixed, 5-year growth intercept formulations are available (see source report).
2. The growth intercept can also be determined by calculating the average annual height growth from the annual branch whorls above breast height. This method is useful when the stem is not suitable for growth intercept measurements (e.g., when the trees have top damage) and for research applications.

Notes:

The growth intercept table (preceding) eliminates the need to calculate the growth intercept. To use the table, first measure the total height of a top height tree and count the annual growth rings at its breast height. Find the row and column most closely corresponding to the ring count and tree height, respectively. The number at the intersection of this row and column is the approximate site index.

The model formulation provides better resolution than the table. For those wanting this resolution, the growth intercept is calculated by subtracting 1.3 from the tree height (in m), dividing by the number of years of growth above breast height (ring count – 0.5), and then multiplying by 100 to convert metres into centimetres. The site index is first calculated for each tree in the plot from its growth intercept and the model corresponding to age = ring count. The site indices are then averaged to get a site index for the plot.

The growth intercept models were developed from 90 stem analysis plots located throughout the interior of British Columbia. Plots ranged in site index from about 12 to 26 m, and the growth intercepts ranged from about 20 to 85 cm. The models can be used throughout the interior of British Columbia.

Interior Spruce

Source:

Nigh, G.D. 1999. Revised growth intercept models for coastal western hemlock, Sitka spruce, and interior spruce. B.C. Min. For., Res. Br., Victoria, B.C. Exten. Note 37.

Formulation:

Age	Model	Age	Model
1	$SI = 1.3 + 4.05\ GI_{1}^{0.463}$	26	$SI = 1.3 + 1.14\ GI_{26}^{0.772}$
2	$SI = 1.3 + 3.22\ GI_{2}^{0.522}$	27	$SI = 1.3 + 1.07\ GI_{27}^{0.789}$
3	$SI = 1.3 + 2.92\ GI_{3}^{0.551}$	28	$SI = 1.3 + 1.01\ GI_{28}^{0.805}$
4	$SI = 1.3 + 2.77\ GI_{4}^{0.567}$	29	$SI = 1.3 + 0.955\ GI_{29}^{0.819}$
5	$SI = 1.3 + 2.75\ GI_{5}^{0.568}$	30	$SI = 1.3 + 0.907\ GI_{30}^{0.833}$
6	$SI = 1.3 + 2.72\ GI_{6}^{0.567}$	31	$SI = 1.3 + 0.867\ GI_{31}^{0.845}$
7	$SI = 1.3 + 2.69\ GI_{7}^{0.567}$	32	$SI = 1.3 + 0.837\ GI_{32}^{0.854}$
8	$SI = 1.3 + 2.65\ GI_{8}^{0.568}$	33	$SI = 1.3 + 0.807\ GI_{33}^{0.864}$
9	$SI = 1.3 + 2.57\ GI_{9}^{0.572}$	34	$SI = 1.3 + 0.775\ GI_{34}^{0.875}$
10	$SI = 1.3 + 2.50\ GI_{10}^{0.577}$	35	$SI = 1.3 + 0.739\ GI_{35}^{0.888}$
11	$SI = 1.3 + 2.47\ GI_{11}^{0.578}$	36	$SI = 1.3 + 0.710\ GI_{36}^{0.899}$
12	$SI = 1.3 + 2.42\ GI_{12}^{0.581}$	37	$SI = 1.3 + 0.686\ GI_{37}^{0.908}$
13	$SI = 1.3 + 2.33\ GI_{13}^{0.589}$	38	$SI = 1.3 + 0.665\ GI_{38}^{0.916}$
14	$SI = 1.3 + 2.26\ GI_{14}^{0.596}$	39	$SI = 1.3 + 0.641\ GI_{39}^{0.926}$
15	$SI = 1.3 + 2.18\ GI_{15}^{0.604}$	40	$SI = 1.3 + 0.616\ GI_{40}^{0.937}$
16	$SI = 1.3 + 2.08\ GI_{16}^{0.615}$	41	$SI = 1.3 + 0.595\ GI_{41}^{0.947}$
17	$SI = 1.3 + 1.97\ GI_{17}^{0.629}$	42	$SI = 1.3 + 0.572\ GI_{42}^{0.958}$
18	$SI = 1.3 + 1.86\ GI_{18}^{0.644}$	43	$SI = 1.3 + 0.551\ GI_{43}^{0.968}$
19	$SI = 1.3 + 1.77\ GI_{19}^{0.656}$	44	$SI = 1.3 + 0.535\ GI_{44}^{0.977}$
20	$SI = 1.3 + 1.67\ GI_{20}^{0.671}$	45	$SI = 1.3 + 0.521\ GI_{45}^{0.984}$
21	$SI = 1.3 + 1.58\ GI_{21}^{0.686}$	46	$SI = 1.3 + 0.510\ GI_{46}^{0.990}$
22	$SI = 1.3 + 1.49\ GI_{22}^{0.702}$	47	$SI = 1.3 + 0.505\ GI_{47}^{0.994}$
23	$SI = 1.3 + 1.39\ GI_{23}^{0.719}$	48	$SI = 1.3 + 0.501\ GI_{48}^{0.996}$
24	$SI = 1.3 + 1.30\ GI_{24}^{0.737}$	49	$SI = 1.3 + 0.497\ GI_{49}^{0.999}$
25	$SI = 1.3 + 1.22\ GI_{25}^{0.755}$	50	$SI = 1.3 + 0.493\ GI_{50}^{1.00}$

where: SI = estimated site index (m at breast height age 50), and
GI = growth intercept (cm/year).

Site Index Table for Interior Spruce

bh ring count	Tree Height (m)													
	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	Site Index (m)													
2	25	39	–	–	–	–	–	–	–	–	–	–	–	–
4	16	26	34	40	–	–	–	–	–	–	–	–	–	–
6	13	20	26	31	35	39	–	–	–	–	–	–	–	–
8	11	17	22	25	29	32	35	38	–	–	–	–	–	–
10	9	15	19	22	25	28	30	33	35	37	40	–	–	–
12	8	13	16	19	22	25	27	29	31	33	35	37	39	40
14	7	12	15	18	20	22	24	26	28	30	32	34	35	37
16	7	10	13	16	18	20	22	24	26	28	29	31	33	34
18	6	9	12	15	17	19	21	23	24	26	28	29	31	32
20	5	8	11	13	15	17	19	21	23	24	26	27	29	30
22	5	8	10	12	14	16	18	20	21	23	24	26	27	29
24	–	7	9	11	13	15	17	18	20	21	23	24	26	27
26	–	6	8	10	12	14	16	17	19	20	22	23	25	26
28	–	6	8	9	11	13	14	16	18	19	20	22	23	25
30	–	5	7	9	10	12	14	15	16	18	19	21	22	23
32	–	5	7	8	10	11	13	14	16	17	18	20	21	22
34	–	5	6	8	9	11	12	13	15	16	17	19	20	21
36	–	–	6	7	9	10	11	13	14	15	16	18	19	20
38	–	–	5	7	8	9	11	12	13	14	16	17	18	19
40	–	–	5	6	8	9	10	11	12	14	15	16	17	18
42	–	–	5	6	7	8	10	11	12	13	14	15	16	18
44	–	–	–	6	7	8	9	10	11	12	13	15	16	17
46	–	–	–	5	6	8	9	10	11	12	13	14	15	16
48	–	–	–	5	6	7	8	9	10	11	12	13	15	16
50	–	–	–	5	6	7	8	9	10	11	12	13	14	15

bh - breast height = 1.3 m

(continued)

Tree Height (m)														bh ring
16	17	18	19	20	21	22	23	24	25	26	27	28	29	count
Site Index (m)														
–	–	–	–	–	–	–	–	–	–	–	–	–	–	2
–	–	–	–	–	–	–	–	–	–	–	–	–	–	4
–	–	–	–	–	–	–	–	–	–	–	–	–	–	6
–	–	–	–	–	–	–	–	–	–	–	–	–	–	8
–	–	–	–	–	–	–	–	–	–	–	–	–	–	10
–	–	–	–	–	–	–	–	–	–	–	–	–	–	12
38	40	–	–	–	–	–	–	–	–	–	–	–	–	14
36	37	38	40	–	–	–	–	–	–	–	–	–	–	16
34	35	36	38	39	40	–	–	–	–	–	–	–	–	18
32	33	34	36	37	38	40	–	–	–	–	–	–	–	20
30	31	33	34	35	37	38	39	40	–	–	–	–	–	22
29	30	31	33	34	35	37	38	39	40	–	–	–	–	24
27	29	30	31	33	34	35	37	38	39	40	–	–	–	26
26	27	29	30	31	33	34	35	36	38	39	40	–	–	28
25	26	27	29	30	31	33	34	35	36	37	39	40	–	30
24	25	26	27	29	30	31	32	34	35	36	37	38	40	32
22	24	25	26	27	29	30	31	32	33	35	36	37	38	34
21	23	24	25	26	27	29	30	31	32	33	35	36	37	36
20	22	23	24	25	26	28	29	30	31	32	33	34	36	38
20	21	22	23	24	25	26	28	29	30	31	32	33	34	40
19	20	21	22	23	24	25	27	28	29	30	31	32	33	42
18	19	20	21	22	23	25	26	27	28	29	30	31	32	44
17	18	19	20	22	23	24	25	26	27	28	29	30	31	46
17	18	19	20	21	22	23	24	25	26	27	28	29	30	48
16	17	18	19	20	21	22	23	24	25	26	27	28	29	50

Options:

1. A conventional, fixed, 5-year growth intercept formulation is available (J.S. Thrower and Associates Ltd. 1995. Growth intercepts for interior spruce in north central British Columbia. Report to the B.C. Ministry of Forests, Silviculture Branch).
2. The growth intercept can also be determined by calculating the average annual height growth from the annual branch whorls above breast height (see source report). This method is useful when the stem is not suitable for growth intercept measurements (e.g., when the trees have top damage) and for research applications.

Notes:

These models were updated to incorporate the latest growth intercept modelling techniques.

The growth intercept table (preceding) eliminates the need to calculate the growth intercept. To use the table, first measure the total height of a top height tree and count the number of annual growth rings at its breast height. Find the row corresponding to the ring count and the column most closely corresponding to the tree height. The number at the intersection of this row and column is the approximate site index.

The model formulation provides better resolution than the table. For those wanting this resolution, the growth intercept is calculated by subtracting 1.3 from the tree height (in m), dividing by the number of years of growth above breast height (ring count – 0.5), and then multiplying by 100 to convert metres into centimetres. The site index is first calculated for each tree in the plot from its growth intercept and the model corresponding to age = ring count. The site indices are then averaged to get a site index for the plot.

The growth intercept models were developed from 87 stem analysis plots. Plots ranged in site index from about 5 to 25 m, and the growth intercepts ranged from about 5 to 50 cm. The models can be used throughout the interior of British Columbia.

Interior Douglas-fir

Source:

Nigh, G.D. 1997. Interior Douglas-fir growth intercept models. B.C. Min. For., Res. Br., Victoria, B.C. Exten. Note 12.

Formulation:

Age	Model	Age	Model
1	$SI = 1.3 + 4.11\ GI_{1}^{0.454}$	26	$SI = 1.3 + 0.635\ GI_{26}^{0.907}$
2	$SI = 1.3 + 3.31\ GI_{2}^{0.514}$	27	$SI = 1.3 + 0.627\ GI_{27}^{0.911}$
3	$SI = 1.3 + 2.36\ GI_{3}^{0.604}$	28	$SI = 1.3 + 0.618\ GI_{28}^{0.915}$
4	$SI = 1.3 + 1.83\ GI_{4}^{0.668}$	29	$SI = 1.3 + 0.607\ GI_{29}^{0.920}$
5	$SI = 1.3 + 1.59\ GI_{5}^{0.700}$	30	$SI = 1.3 + 0.596\ GI_{30}^{0.926}$
6	$SI = 1.3 + 1.46\ GI_{6}^{0.719}$	31	$SI = 1.3 + 0.583\ GI_{31}^{0.933}$
7	$SI = 1.3 + 1.33\ GI_{7}^{0.739}$	32	$SI = 1.3 + 0.571\ GI_{32}^{0.939}$
8	$SI = 1.3 + 1.24\ GI_{8}^{0.755}$	33	$SI = 1.3 + 0.567\ GI_{33}^{0.942}$
9	$SI = 1.3 + 1.20\ GI_{9}^{0.757}$	34	$SI = 1.3 + 0.551\ GI_{34}^{0.950}$
10	$SI = 1.3 + 1.13\ GI_{10}^{0.772}$	35	$SI = 1.3 + 0.542\ GI_{35}^{0.956}$
11	$SI = 1.3 + 1.07\ GI_{11}^{0.782}$	36	$SI = 1.3 + 0.534\ GI_{36}^{0.961}$
12	$SI = 1.3 + 0.972\ GI_{12}^{0.805}$	37	$SI = 1.3 + 0.529\ GI_{37}^{0.965}$
13	$SI = 1.3 + 0.914\ GI_{13}^{0.819}$	38	$SI = 1.3 + 0.522\ GI_{38}^{0.969}$
14	$SI = 1.3 + 0.870\ GI_{14}^{0.830}$	39	$SI = 1.3 + 0.518\ GI_{39}^{0.973}$
15	$SI = 1.3 + 0.849\ GI_{15}^{0.835}$	40	$SI = 1.3 + 0.506\ GI_{40}^{0.980}$
16	$SI = 1.3 + 0.822\ GI_{16}^{0.842}$	41	$SI = 1.3 + 0.500\ GI_{41}^{0.985}$
17	$SI = 1.3 + 0.801\ GI_{17}^{0.847}$	42	$SI = 1.3 + 0.496\ GI_{42}^{0.989}$
18	$SI = 1.3 + 0.788\ GI_{18}^{0.851}$	43	$SI = 1.3 + 0.494\ GI_{43}^{0.991}$
19	$SI = 1.3 + 0.772\ GI_{19}^{0.855}$	44	$SI = 1.3 + 0.493\ GI_{44}^{0.993}$
20	$SI = 1.3 + 0.753\ GI_{20}^{0.861}$	45	$SI = 1.3 + 0.493\ GI_{45}^{0.995}$
21	$SI = 1.3 + 0.727\ GI_{21}^{0.870}$	46	$SI = 1.3 + 0.488\ GI_{46}^{0.999}$
22	$SI = 1.3 + 0.720\ GI_{22}^{0.873}$	47	$SI = 1.3 + 0.487\ GI_{47}^{1.00}$
23	$SI = 1.3 + 0.686\ GI_{23}^{0.886}$	48	$SI = 1.3 + 0.486\ GI_{48}^{1.00}$
24	$SI = 1.3 + 0.679\ GI_{24}^{0.889}$	49	$SI = 1.3 + 0.490\ GI_{49}^{1.00}$
25	$SI = 1.3 + 0.658\ GI_{25}^{0.897}$	50	$SI = 1.3 + 0.495\ GI_{50}^{1.00}$

where: SI = estimated site index (m at breast height age 50), and
GI = growth intercept (cm/year).

Site Index Table for Interior Douglas-fir

bh ring count	Tree Height (m)													
	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	Site Index (m)													
2	25	39	–	–	–	–	–	–	–	–	–	–	–	–
4	15	26	35	–	–	–	–	–	–	–	–	–	–	–
6	10	18	25	31	37	–	–	–	–	–	–	–	–	–
8	8	14	20	25	29	34	38	–	–	–	–	–	–	–
10	7	12	16	20	24	28	31	35	38	–	–	–	–	–
12	5	10	14	17	21	24	27	30	33	36	39	–	–	–
14	5	8	12	15	18	21	24	26	29	32	34	37	39	–
16	–	7	10	13	16	18	21	23	26	28	30	33	35	37
18	–	7	9	12	14	17	19	21	23	25	27	29	31	33
20	–	6	9	11	13	15	17	19	21	23	25	27	29	31
22	–	6	8	10	12	14	16	18	20	21	23	25	27	28
24	–	5	7	9	11	13	15	16	18	20	22	23	25	26
26	–	5	7	8	10	12	14	15	17	19	20	22	23	25
28	–	5	6	8	10	11	13	14	16	17	19	20	22	23
30	–	–	6	7	9	11	12	14	15	16	18	19	21	22
32	–	–	6	7	9	10	11	13	14	16	17	18	20	21
34	–	–	5	7	8	9	11	12	13	15	16	17	19	20
36	–	–	5	6	8	9	10	12	13	14	15	17	18	19
38	–	–	5	6	7	9	10	11	12	14	15	16	17	18
40	–	–	5	6	7	8	9	11	12	13	14	15	16	18
42	–	–	–	6	7	8	9	10	11	12	14	15	16	17
44	–	–	–	5	7	8	9	10	11	12	13	14	15	16
46	–	–	–	5	6	7	8	10	11	12	13	14	15	16
48	–	–	–	5	6	7	8	9	10	11	12	13	14	15
50	–	–	–	5	6	7	8	9	10	11	12	13	14	15

bh - breast height = 1.3 m

(continued)

Tree Height (m)														bh ring
16	17	18	19	20	21	22	23	24	25	26	27	28	29	count
Site Index (m)														
–	–	–	–	–	–	–	–	–	–	–	–	–	–	2
–	–	–	–	–	–	–	–	–	–	–	–	–	–	4
–	–	–	–	–	–	–	–	–	–	–	–	–	–	6
–	–	–	–	–	–	–	–	–	–	–	–	–	–	8
–	–	–	–	–	–	–	–	–	–	–	–	–	–	10
–	–	–	–	–	–	–	–	–	–	–	–	–	–	12
–	–	–	–	–	–	–	–	–	–	–	–	–	–	14
39	–	–	–	–	–	–	–	–	–	–	–	–	–	16
35	37	39	–	–	–	–	–	–	–	–	–	–	–	18
32	34	36	38	40	–	–	–	–	–	–	–	–	–	20
30	32	33	35	37	38	40	–	–	–	–	–	–	–	22
28	30	31	33	34	36	38	39	–	–	–	–	–	–	24
26	28	29	31	33	34	36	37	38	40	–	–	–	–	26
25	26	28	29	31	32	34	35	36	38	39	–	–	–	28
24	25	26	28	29	30	32	33	35	36	37	39	40	–	30
22	24	25	26	28	29	30	32	33	34	36	37	38	39	32
21	23	24	25	26	28	29	30	32	33	34	35	37	38	34
20	22	23	24	25	27	28	29	30	32	33	34	35	36	36
20	21	22	23	24	26	27	28	29	30	32	33	34	35	38
19	20	21	22	23	25	26	27	28	29	30	32	33	34	40
18	19	20	22	23	24	25	26	27	28	29	31	32	33	42
18	19	20	21	22	23	24	25	26	27	29	30	31	32	44
17	18	19	20	21	22	23	24	26	27	28	29	30	31	46
16	17	18	20	21	22	23	24	25	26	27	28	29	30	48
16	17	18	19	20	21	22	23	24	25	26	27	28	29	50

Options:

1. The growth intercept can also be determined by calculating the average annual height growth from the annual branch whorls above breast height. This method is useful when the stem is not suitable for growth intercept measurements (e.g., when the trees have top damage) and for research applications.

Notes:

The growth intercept table (preceding) eliminates the need to calculate the growth intercept. To use the table, first measure the total height of a top height tree and count the number of annual growth rings at its breast height. Find the row and column most closely corresponding to the ring count and tree height, respectively. The number at the intersection of this row and column is the approximate site index.

The model formulation provides better resolution than the table. For those wanting this resolution, the growth intercept is calculated by subtracting 1.3 from the tree height (in m), dividing by the number of years of growth above breast height (ring count – 0.5), and then multiplying by 100 to convert metres into centimetres. The site index is first calculated for each tree in the plot from its growth intercept and the model corresponding to age = ring count. The site indices are then averaged to get a site index for the plot.

The growth intercept models were developed from 72 stem analysis plots located throughout the interior of British Columbia. Plots ranged in site index from about 10 to 29 m, and the growth intercepts ranged from about 10 to 64 cm. The models can be used throughout the interior of British Columbia.

Interior Western Hemlock

Source:

Nigh, G.D. 1998. A system for estimating height and site index of western hemlock in the interior of British Columbia. For. Chron. 74: 588–596.

Formulation:

Age	Mode	Age	Model
1	$SI = 1.3 + 4.31\ GI_{1}^{0.413}$	26	$SI = 1.3 + 0.885\ GI_{26}^{0.839}$
2	$SI = 1.3 + 4.54\ GI_{2}^{0.380}$	27	$SI = 1.3 + 0.841\ GI_{27}^{0.853}$
3	$SI = 1.3 + 4.34\ GI_{3}^{0.390}$	28	$SI = 1.3 + 0.803\ GI_{28}^{0.866}$
4	$SI = 1.3 + 3.80\ GI_{4}^{0.431}$	29	$SI = 1.3 + 0.771\ GI_{29}^{0.877}$
5	$SI = 1.3 + 3.36\ GI_{5}^{0.471}$	30	$SI = 1.3 + 0.745\ GI_{30}^{0.886}$
6	$SI = 1.3 + 3.08\ GI_{6}^{0.499}$	31	$SI = 1.3 + 0.728\ GI_{31}^{0.892}$
7	$SI = 1.3 + 3.00\ GI_{7}^{0.506}$	32	$SI = 1.3 + 0.721\ GI_{32}^{0.895}$
8	$SI = 1.3 + 3.08\ GI_{8}^{0.496}$	33	$SI = 1.3 + 0.721\ GI_{33}^{0.894}$
9	$SI = 1.3 + 3.06\ GI_{9}^{0.496}$	34	$SI = 1.3 + 0.728\ GI_{34}^{0.891}$
10	$SI = 1.3 + 2.92\ GI_{10}^{0.509}$	35	$SI = 1.3 + 0.733\ GI_{35}^{0.888}$
11	$SI = 1.3 + 2.70\ GI_{11}^{0.531}$	36	$SI = 1.3 + 0.724\ GI_{36}^{0.891}$
12	$SI = 1.3 + 2.42\ GI_{12}^{0.562}$	37	$SI = 1.3 + 0.707\ GI_{37}^{0.897}$
13	$SI = 1.3 + 2.18\ GI_{13}^{0.591}$	38	$SI = 1.3 + 0.685\ GI_{38}^{0.906}$
14	$SI = 1.3 + 2.00\ GI_{14}^{0.615}$	39	$SI = 1.3 + 0.666\ GI_{39}^{0.914}$
15	$SI = 1.3 + 1.82\ GI_{15}^{0.642}$	40	$SI = 1.3 + 0.648\ GI_{40}^{0.922}$
16	$SI = 1.3 + 1.64\ GI_{16}^{0.670}$	41	$SI = 1.3 + 0.629\ GI_{41}^{0.930}$
17	$SI = 1.3 + 1.50\ GI_{17}^{0.696}$	42	$SI = 1.3 + 0.612\ GI_{42}^{0.938}$
18	$SI = 1.3 + 1.38\ GI_{18}^{0.718}$	43	$SI = 1.3 + 0.592\ GI_{43}^{0.948}$
19	$SI = 1.3 + 1.30\ GI_{19}^{0.736}$	44	$SI = 1.3 + 0.569\ GI_{44}^{0.960}$
20	$SI = 1.3 + 1.22\ GI_{20}^{0.754}$	45	$SI = 1.3 + 0.546\ GI_{45}^{0.972}$
21	$SI = 1.3 + 1.15\ GI_{21}^{0.769}$	46	$SI = 1.3 + 0.527\ GI_{46}^{0.982}$
22	$SI = 1.3 + 1.10\ GI_{22}^{0.781}$	47	$SI = 1.3 + 0.514\ GI_{47}^{0.989}$
23	$SI = 1.3 + 1.05\ GI_{23}^{0.792}$	48	$SI = 1.3 + 0.506\ GI_{48}^{0.993}$
24	$SI = 1.3 + 1.00\ GI_{24}^{0.805}$	49	$SI = 1.3 + 0.500\ GI_{49}^{0.997}$
25	$SI = 1.3 + 0.941\ GI_{25}^{0.822}$	50	$SI = 1.3 + 0.494\ GI_{50}^{1.00}$

where: SI = estimated site index (m at breast height age 50), and
GI = growth intercept (cm/year).

Site Index Table for Interior Western Hemlock

bh ring count	Tree Height (m)													
	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	Site Index (m)													
2	21	29	34	38	–	–	–	–	–	–	–	–	–	–
4	15	22	26	30	33	36	38	40	–	–	–	–	–	–
6	12	18	23	26	30	32	35	37	40	–	–	–	–	–
8	11	16	19	23	25	28	30	32	34	36	37	39	40	–
10	9	14	17	20	23	25	27	29	30	32	34	35	37	38
12	8	12	16	18	21	23	25	27	29	31	32	34	35	37
14	7	11	14	17	19	21	23	25	27	29	31	32	34	36
16	6	9	12	15	17	20	22	24	26	28	29	31	33	34
18	5	8	11	14	16	18	20	22	24	26	28	30	31	33
20	–	8	10	13	15	17	19	21	23	24	26	28	30	31
22	–	7	9	11	14	16	17	19	21	23	25	26	28	30
24	–	6	8	11	12	14	16	18	20	21	23	25	26	28
26	–	6	8	10	11	13	15	17	18	20	22	23	25	26
28	–	5	7	9	11	12	14	16	17	19	20	22	23	25
30	–	5	7	8	10	12	13	15	16	18	19	21	22	24
32	–	5	6	8	9	11	12	14	15	17	18	20	21	22
34	–	–	6	7	9	10	12	13	15	16	17	19	20	21
36	–	–	6	7	9	10	11	13	14	15	16	18	19	20
38	–	–	5	7	8	9	11	12	13	14	16	17	18	19
40	–	–	5	6	8	9	10	11	13	14	15	16	17	18
42	–	–	5	6	7	8	10	11	12	13	14	15	16	18
44	–	–	5	6	7	8	9	10	11	13	14	15	16	17
46	–	–	–	5	7	8	9	10	11	12	13	14	15	16
48	–	–	–	5	6	7	8	9	10	11	12	14	15	16
50	–	–	–	5	6	7	8	9	10	11	12	13	14	15

bh - breast height = 1.3 m

(continued)

Tree Height (m)														bh ring
16	17	18	19	20	21	22	23	24	25	26	27	28	29	count
Site Index (m)														
–	–	–	–	–	–	–	–	–	–	–	–	–	–	2
–	–	–	–	–	–	–	–	–	–	–	–	–	–	4
–	–	–	–	–	–	–	–	–	–	–	–	–	–	6
–	–	–	–	–	–	–	–	–	–	–	–	–	–	8
39	–	–	–	–	–	–	–	–	–	–	–	–	–	10
38	40	–	–	–	–	–	–	–	–	–	–	–	–	12
37	39	40	–	–	–	–	–	–	–	–	–	–	–	14
36	38	39	–	–	–	–	–	–	–	–	–	–	–	16
35	36	38	39	–	–	–	–	–	–	–	–	–	–	18
33	35	36	38	39	–	–	–	–	–	–	–	–	–	20
31	33	34	36	37	39	40	–	–	–	–	–	–	–	22
29	31	32	34	35	37	38	40	–	–	–	–	–	–	24
28	29	31	32	34	35	37	38	40	–	–	–	–	–	26
26	28	29	31	32	34	35	37	38	39	–	–	–	–	28
25	27	28	29	31	32	33	35	36	38	39	40	–	–	30
24	25	26	28	29	30	32	33	34	36	37	38	40	–	32
22	24	25	26	28	29	30	31	32	34	35	36	37	38	34
21	23	24	25	26	27	28	30	31	32	33	34	35	36	36
20	21	23	24	25	26	27	28	29	31	32	33	34	35	38
19	21	22	23	24	25	26	27	28	30	31	32	33	34	40
19	20	21	22	23	24	25	26	27	29	30	31	32	33	42
18	19	20	21	22	23	24	26	27	28	29	30	31	32	44
17	18	19	20	22	23	24	25	26	27	28	29	30	31	46
17	18	19	20	21	22	23	24	25	26	27	28	29	30	48
16	17	18	19	20	21	22	23	24	25	26	27	28	29	50

Options:

1. The growth intercept can also be determined by calculating the average annual height growth from the sub-nodal branches. This method is useful when the stem is not suitable for growth intercept measurements (e.g., when the trees have top damage) and for research applications.

Notes:

The growth intercept table (preceding) eliminates the need to calculate the growth intercept. To use the table, first measure the total height of a top height tree and count the number of annual growth rings at its breast height. Find the row and column most closely corresponding to the ring count and tree height, respectively. The number at the intersection of this row and column is the approximate site index.

The model formulation provides better resolution than the table. For those wanting this resolution, the growth intercept is calculated by subtracting 1.3 from the tree height (in m), dividing by the number of years of growth above breast height (ring count – 0.5), and then multiplying by 100 to convert metres into centimetres. The site index is first calculated for each tree in the plot from its growth intercept and the model corresponding to age = ring count. The site indices are then averaged to get a site index for the plot.

The growth intercept models were developed from 44 stem analysis plots located throughout the Interior Cedar–Hemlock zone of British Columbia. Plots ranged in site index from about 6 to 25 m, and the growth intercepts ranged from about 10 to 50 cm. The models can be used throughout the interior of British Columbia.

Interior Subalpine Fir

Source:

J.S. Thrower & Associates Ltd. 1997. Development of a growth intercept model for interior balsam. B.C. Min. For., Forest Practices Br., Victoria, B.C. Rep. No. MFS-403-023.

Formulation:

Age	Model	Age	Model
1	$SI = 1.3 + 2.46\ GI_{1}^{0.581}$	26	$SI = 1.3 + 1.13\ GI_{26}^{0.757}$
2	$SI = 1.3 + 1.67\ GI_{2}^{0.708}$	27	$SI = 1.3 + 1.09\ GI_{27}^{0.767}$
3	$SI = 1.3 + 1.57\ GI_{3}^{0.724}$	28	$SI = 1.3 + 1.06\ GI_{28}^{0.774}$
4	$SI = 1.3 + 1.56\ GI_{4}^{0.719}$	29	$SI = 1.3 + 1.01\ GI_{29}^{0.787}$
5	$SI = 1.3 + 1.63\ GI_{5}^{0.700}$	30	$SI = 1.3 + 0.969\ GI_{30}^{0.799}$
6	$SI = 1.3 + 1.64\ GI_{6}^{0.694}$	31	$SI = 1.3 + 0.937\ GI_{31}^{0.808}$
7	$SI = 1.3 + 1.60\ GI_{7}^{0.698}$	32	$SI = 1.3 + 0.892\ GI_{32}^{0.822}$
8	$SI = 1.3 + 1.65\ GI_{8}^{0.686}$	33	$SI = 1.3 + 0.851\ GI_{33}^{0.835}$
9	$SI = 1.3 + 1.66\ GI_{9}^{0.680}$	34	$SI = 1.3 + 0.819\ GI_{34}^{0.847}$
10	$SI = 1.3 + 1.65\ GI_{10}^{0.679}$	35	$SI = 1.3 + 0.790\ GI_{35}^{0.857}$
11	$SI = 1.3 + 1.64\ GI_{11}^{0.677}$	36	$SI = 1.3 + 0.755\ GI_{36}^{0.870}$
12	$SI = 1.3 + 1.62\ GI_{12}^{0.678}$	37	$SI = 1.3 + 0.727\ GI_{37}^{0.881}$
13	$SI = 1.3 + 1.63\ GI_{13}^{0.674}$	38	$SI = 1.3 + 0.702\ GI_{38}^{0.892}$
14	$SI = 1.3 + 1.61\ GI_{14}^{0.675}$	39	$SI = 1.3 + 0.681\ GI_{39}^{0.901}$
15	$SI = 1.3 + 1.58\ GI_{15}^{0.678}$	40	$SI = 1.3 + 0.652\ GI_{40}^{0.914}$
16	$SI = 1.3 + 1.55\ GI_{16}^{0.679}$	41	$SI = 1.3 + 0.628\ GI_{41}^{0.925}$
17	$SI = 1.3 + 1.51\ GI_{17}^{0.685}$	42	$SI = 1.3 + 0.608\ GI_{42}^{0.935}$
18	$SI = 1.3 + 1.49\ GI_{18}^{0.685}$	43	$SI = 1.3 + 0.592\ GI_{43}^{0.944}$
19	$SI = 1.3 + 1.45\ GI_{19}^{0.692}$	44	$SI = 1.3 + 0.575\ GI_{44}^{0.952}$
20	$SI = 1.3 + 1.40\ GI_{20}^{0.701}$	45	$SI = 1.3 + 0.561\ GI_{45}^{0.960}$
21	$SI = 1.3 + 1.36\ GI_{21}^{0.707}$	46	$SI = 1.3 + 0.550\ GI_{46}^{0.966}$
22	$SI = 1.3 + 1.32\ GI_{22}^{0.715}$	47	$SI = 1.3 + 0.535\ GI_{47}^{0.975}$
23	$SI = 1.3 + 1.27\ GI_{23}^{0.724}$	48	$SI = 1.3 + 0.523\ GI_{48}^{0.983}$
24	$SI = 1.3 + 1.24\ GI_{24}^{0.731}$	49	$SI = 1.3 + 0.508\ GI_{49}^{0.992}$
25	$SI = 1.3 + 1.18\ GI_{25}^{0.745}$	50	$SI = 1.3 + 0.494\ GI_{50}^{1.00}$

where: SI = estimated site index (m at breast height age 50), and
GI = growth intercept (cm/year).

Site Index Table for Interior Subalpine Fir

bh ring count	Tree Height (m)													
	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	Site Index (m)													
2	27	–	–	–	–	–	–	–	–	–	–	–	–	–
4	15	27	37	–	–	–	–	–	–	–	–	–	–	–
6	11	19	26	32	37	–	–	–	–	–	–	–	–	–
8	9	15	21	25	29	33	37	–	–	–	–	–	–	–
10	8	13	17	21	25	28	31	34	37	39	–	–	–	–
12	7	11	15	18	21	24	27	29	32	34	36	39	–	–
14	6	10	13	16	19	21	24	26	28	30	32	34	36	38
16	6	9	12	15	17	19	21	23	25	27	29	31	32	34
18	5	8	11	13	16	18	19	21	23	25	26	28	29	31
20	5	8	10	12	14	16	18	20	21	23	24	26	27	29
22	–	7	9	11	13	15	17	18	20	21	23	24	26	27
24	–	7	9	11	12	14	16	17	19	20	22	23	24	26
26	–	6	8	10	12	13	15	16	18	19	20	22	23	24
28	–	6	7	9	11	12	14	15	17	18	19	21	22	23
30	–	5	7	9	10	12	13	14	16	17	18	20	21	22
32	–	5	7	8	10	11	12	14	15	16	17	19	20	21
34	–	5	6	8	9	10	12	13	14	15	17	18	19	20
36	–	–	6	7	8	10	11	12	14	15	16	17	18	19
38	–	–	5	7	8	9	10	12	13	14	15	16	18	19
40	–	–	5	6	8	9	10	11	12	13	15	16	17	18
42	–	–	5	6	7	8	9	11	12	13	14	15	16	17
44	–	–	5	6	7	8	9	10	11	12	13	15	16	17
46	–	–	–	5	7	8	9	10	11	12	13	14	15	16
48	–	–	–	5	6	7	8	9	10	11	12	13	15	16
50	–	–	–	5	6	7	8	9	10	11	12	13	14	15

bh - breast height = 1.3 m

(continued)

Tree Height (m)														bh ring
16	17	18	19	20	21	22	23	24	25	26	27	28	29	count
Site Index (m)														
–	–	–	–	–	–	–	–	–	–	–	–	–	–	2
–	–	–	–	–	–	–	–	–	–	–	–	–	–	4
–	–	–	–	–	–	–	–	–	–	–	–	–	–	6
–	–	–	–	–	–	–	–	–	–	–	–	–	–	8
–	–	–	–	–	–	–	–	–	–	–	–	–	–	10
–	–	–	–	–	–	–	–	–	–	–	–	–	–	12
39	–	–	–	–	–	–	–	–	–	–	–	–	–	14
35	37	38	40	–	–	–	–	–	–	–	–	–	–	16
32	34	35	37	38	39	–	–	–	–	–	–	–	–	18
30	32	33	34	36	37	38	39	–	–	–	–	–	–	20
28	30	31	32	33	35	36	37	38	39	–	–	–	–	22
27	28	29	31	32	33	34	35	36	37	39	40	–	–	24
26	27	28	29	30	32	33	34	35	36	37	38	39	–	26
24	26	27	28	29	30	31	32	34	35	36	37	38	39	28
23	24	26	27	28	29	30	31	32	34	35	36	37	38	30
22	23	25	26	27	28	29	30	31	32	33	35	36	37	32
21	23	24	25	26	27	28	29	30	31	33	34	35	36	34
21	22	23	24	25	26	27	28	29	31	32	33	34	35	36
20	21	22	23	24	25	26	27	29	30	31	32	33	34	38
19	20	21	22	23	25	26	27	28	29	30	31	32	33	40
18	19	21	22	23	24	25	26	27	28	29	30	31	32	42
18	19	20	21	22	23	24	25	26	27	28	29	30	31	44
17	18	19	20	21	22	23	24	25	26	27	28	29	30	46
17	18	19	20	21	22	23	24	25	26	27	28	29	30	48
16	17	18	19	20	21	22	23	24	25	26	27	28	29	50

Options:

1. The growth intercept can also be determined by calculating the average annual height growth from the annual branch whorls above breast height. This method is useful when the stem is not suitable for growth intercept measurements (e.g., when the trees have top damage) and for research applications.

Notes:

The growth intercept table (preceding) eliminates the need to calculate the growth intercept. To use the table, first measure the total height of a top height tree and count the number of annual growth rings at its breast height. Find the row and column most closely corresponding to the ring count and tree height, respectively. The number at the intersection of this row and column is the approximate site index.

The model formulation provides better resolution than the table. For those wanting this resolution, the growth intercept is calculated by subtracting 1.3 from the tree height (in m), dividing by the number of years of growth above breast height (ring count – 0.5), and then multiplying by 100 to convert metres into centimetres. The site index is first calculated for each tree in the plot from its growth intercept and the model corresponding to age = ring count. The site indices are then averaged to get a site index for the plot.

The growth intercept models were developed from 55 stem analysis plots located throughout the interior of British Columbia. Plots ranged in site index from about 3 to 23 m, and the growth intercepts ranged from about 4 to 50 cm. The models can be used throughout the interior of British Columbia.

Western Redcedar

Source:

Nigh, G.D. [1999]. Western redcedar site index models for the interior of British Columbia. B.C. Min. For., Res. Br., Victoria, B.C. Res. Rep. [in press].

Formulation:

Age	Model	Age	Model
1	$SI = 1.3 + 3.74\ GI_{1}^{0.477}$	26	$SI = 1.3 + 1.73\ GI_{26}^{0.648}$
2	$SI = 1.3 + 4.12\ GI_{2}^{0.428}$	27	$SI = 1.3 + 1.63\ GI_{27}^{0.663}$
3	$SI = 1.3 + 4.12\ GI_{3}^{0.425}$	28	$SI = 1.3 + 1.56\ GI_{28}^{0.676}$
4	$SI = 1.3 + 3.92\ GI_{4}^{0.440}$	29	$SI = 1.3 + 1.49\ GI_{29}^{0.687}$
5	$SI = 1.3 + 3.88\ GI_{5}^{0.443}$	30	$SI = 1.3 + 1.42\ GI_{30}^{0.699}$
6	$SI = 1.3 + 3.89\ GI_{6}^{0.441}$	31	$SI = 1.3 + 1.36\ GI_{31}^{0.711}$
7	$SI = 1.3 + 3.84\ GI_{7}^{0.444}$	32	$SI = 1.3 + 1.29\ GI_{32}^{0.726}$
8	$SI = 1.3 + 3.70\ GI_{8}^{0.454}$	33	$SI = 1.3 + 1.22\ GI_{33}^{0.741}$
9	$SI = 1.3 + 3.61\ GI_{9}^{0.459}$	34	$SI = 1.3 + 1.16\ GI_{34}^{0.755}$
10	$SI = 1.3 + 3.52\ GI_{10}^{0.464}$	35	$SI = 1.3 + 1.11\ GI_{35}^{0.769}$
11	$SI = 1.3 + 3.43\ GI_{11}^{0.469}$	36	$SI = 1.3 + 1.06\ GI_{36}^{0.781}$
12	$SI = 1.3 + 3.33\ GI_{12}^{0.476}$	37	$SI = 1.3 + 1.01\ GI_{37}^{0.795}$
13	$SI = 1.3 + 3.23\ GI_{13}^{0.484}$	38	$SI = 1.3 + 0.952\ GI_{38}^{0.811}$
14	$SI = 1.3 + 3.15\ GI_{14}^{0.490}$	39	$SI = 1.3 + 0.899\ GI_{39}^{0.827}$
15	$SI = 1.3 + 3.05\ GI_{15}^{0.497}$	40	$SI = 1.3 + 0.856\ GI_{40}^{0.841}$
16	$SI = 1.3 + 2.93\ GI_{16}^{0.508}$	41	$SI = 1.3 + 0.815\ GI_{41}^{0.855}$
17	$SI = 1.3 + 2.78\ GI_{17}^{0.521}$	42	$SI = 1.3 + 0.770\ GI_{42}^{0.872}$
18	$SI = 1.3 + 2.65\ GI_{18}^{0.534}$	43	$SI = 1.3 + 0.725\ GI_{43}^{0.889}$
19	$SI = 1.3 + 2.52\ GI_{19}^{0.547}$	44	$SI = 1.3 + 0.682\ GI_{44}^{0.907}$
20	$SI = 1.3 + 2.40\ GI_{20}^{0.560}$	45	$SI = 1.3 + 0.640\ GI_{45}^{0.925}$
21	$SI = 1.3 + 2.28\ GI_{21}^{0.573}$	46	$SI = 1.3 + 0.600\ GI_{46}^{0.944}$
22	$SI = 1.3 + 2.17\ GI_{22}^{0.586}$	47	$SI = 1.3 + 0.564\ GI_{47}^{0.962}$
23	$SI = 1.3 + 2.05\ GI_{23}^{0.601}$	48	$SI = 1.3 + 0.539\ GI_{48}^{0.975}$
24	$SI = 1.3 + 1.93\ GI_{24}^{0.617}$	49	$SI = 1.3 + 0.517\ GI_{49}^{0.988}$
25	$SI = 1.3 + 1.83\ GI_{25}^{0.633}$	50	$SI = 1.3 + 0.495\ GI_{50}^{1.00}$

where: SI = estimated site index (m at breast height age 50), and
GI = growth intercept (cm/year).

Site Index Table for Western Redcedar

bh ring count	Tree Height (m)													
	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	Site Index (m)													
2	23	33	39	–	–	–	–	–	–	–	–	–	–	–
4	16	23	28	32	35	38	–	–	–	–	–	–	–	–
6	13	19	23	26	29	31	34	36	38	39	–	–	–	–
8	11	17	20	23	25	28	30	32	33	35	36	38	39	–
10	10	15	18	21	23	25	27	28	30	31	33	34	35	37
12	9	13	16	19	21	23	24	26	27	29	30	31	33	34
14	8	12	15	17	19	21	23	24	26	27	28	29	30	32
16	8	11	14	16	18	20	21	23	24	25	26	28	29	30
18	7	10	13	15	17	18	20	21	23	24	25	26	27	28
20	6	9	12	14	16	17	19	20	21	23	24	25	26	27
22	6	9	11	13	15	16	18	19	20	22	23	24	25	26
24	5	8	10	12	14	15	17	18	19	21	22	23	24	25
26	5	7	9	11	13	14	16	17	18	20	21	22	23	24
28	–	7	9	10	12	13	15	16	17	19	20	21	22	23
30	–	6	8	10	11	13	14	15	16	18	19	20	21	22
32	–	6	7	9	10	12	13	14	16	17	18	19	20	21
34	–	5	7	8	10	11	12	14	15	16	17	18	19	20
36	–	5	6	8	9	11	12	13	14	15	16	18	19	20
38	–	5	6	7	9	10	11	12	13	15	16	17	18	19
40	–	–	6	7	8	9	11	12	13	14	15	16	17	18
42	–	–	5	6	8	9	10	11	12	13	14	15	16	18
44	–	–	5	6	7	8	9	11	12	13	14	15	16	17
46	–	–	5	6	7	8	9	10	11	12	13	14	15	16
48	–	–	–	5	6	7	8	9	10	12	13	14	15	16
50	–	–	–	5	6	7	8	9	10	11	12	13	14	15

bh - breast height = 1.3 m

(continued)

Tree Height (m)														bh ring
16	17	18	19	20	21	22	23	24	25	26	27	28	29	count
Site Index (m)														
–	–	–	–	–	–	–	–	–	–	–	–	–	–	2
–	–	–	–	–	–	–	–	–	–	–	–	–	–	4
–	–	–	–	–	–	–	–	–	–	–	–	–	–	6
–	–	–	–	–	–	–	–	–	–	–	–	–	–	8
38	39	40	–	–	–	–	–	–	–	–	–	–	–	10
35	36	37	38	39	40	–	–	–	–	–	–	–	–	12
33	34	35	36	37	37	38	39	40	–	–	–	–	–	14
31	32	33	34	35	36	36	37	38	39	40	40	–	–	16
29	30	31	32	33	34	35	36	37	38	38	39	40	–	18
28	29	30	31	32	33	34	35	36	36	37	38	39	40	20
27	28	29	30	31	32	33	34	35	35	36	37	38	39	22
26	27	28	29	30	31	32	33	34	35	35	36	37	38	24
25	26	27	28	29	30	31	32	33	34	35	36	36	37	26
24	25	26	27	28	29	30	31	32	33	34	35	36	36	28
23	24	25	26	27	28	29	30	31	32	33	34	35	35	30
22	23	24	25	26	27	28	29	30	31	32	33	34	35	32
21	22	24	25	25	26	27	28	29	30	31	32	33	34	34
21	22	23	24	25	26	27	28	29	29	30	31	32	33	36
20	21	22	23	24	25	26	27	28	29	30	31	32	32	38
19	20	21	22	23	24	25	26	27	28	29	30	31	32	40
19	20	21	22	23	24	25	26	26	27	28	29	30	31	42
18	19	20	21	22	23	24	25	26	27	28	29	30	31	44
17	18	19	20	21	22	23	24	25	26	27	28	29	30	46
17	18	19	20	21	22	23	24	25	26	27	28	29	30	48
16	17	18	19	20	21	22	23	24	25	26	27	28	29	50

Notes:

The growth intercept table (preceding) eliminates the need to calculate the growth intercept. To use the table, first measure the total height of a top height tree and count the number of annual growth rings at its breast height. Find the row corresponding to the ring count and the column most closely corresponding to the tree height. The number at the intersection of this row and column is the approximate site index.

The model formulation provides better resolution than the table. For those wanting this resolution, the growth intercept is calculated by subtracting 1.3 from the tree height (in m), dividing by the number of years of growth above breast height (ring count – 0.5), and then multiplying by 100 to convert metres into centimetres. The site index is first calculated for each tree in the plot from its growth intercept and the model corresponding to age = ring count. The site indices are then averaged to get a site index for the plot.

The growth intercept models were developed from 46 stem analysis plots located in the Interior Cedar–Hemlock and Interior Douglas-fir biogeoclimatic zones. Plots ranged in site index from about 10 to 25 m, and the growth intercepts ranged from about 10 to 50 cm. The models can be used throughout the interior of British Columbia.

Western Larch

Source:

Nigh, G.D., D. Brisco, and D. New. 1999. Growth intercept models for western larch. B.C. Min. For., Res. Br., Victoria, B.C. Exten. Note 38.

Formulation:

Age	Model	Age	Model
1	$SI = 1.3 + 6.35\ GI_{1}^{0.286}$	26	$SI = 1.3 + 1.16\ GI_{26}^{0.744}$
2	$SI = 1.3 + 6.43\ GI_{2}^{0.284}$	27	$SI = 1.3 + 1.10\ GI_{27}^{0.758}$
3	$SI = 1.3 + 5.87\ GI_{3}^{0.311}$	28	$SI = 1.3 + 1.04\ GI_{28}^{0.775}$
4	$SI = 1.3 + 5.29\ GI_{4}^{0.340}$	29	$SI = 1.3 + 0.993\ GI_{29}^{0.789}$
5	$SI = 1.3 + 4.89\ GI_{5}^{0.362}$	30	$SI = 1.3 + 0.954\ GI_{30}^{0.800}$
6	$SI = 1.3 + 4.62\ GI_{6}^{0.377}$	31	$SI = 1.3 + 0.917\ GI_{31}^{0.812}$
7	$SI = 1.3 + 4.02\ GI_{7}^{0.414}$	32	$SI = 1.3 + 0.886\ GI_{32}^{0.822}$
8	$SI = 1.3 + 3.87\ GI_{8}^{0.423}$	33	$SI = 1.3 + 0.854\ GI_{33}^{0.833}$
9	$SI = 1.3 + 3.67\ GI_{9}^{0.436}$	34	$SI = 1.3 + 0.814\ GI_{34}^{0.847}$
10	$SI = 1.3 + 3.39\ GI_{10}^{0.457}$	35	$SI = 1.3 + 0.775\ GI_{35}^{0.861}$
11	$SI = 1.3 + 3.07\ GI_{11}^{0.483}$	36	$SI = 1.3 + 0.745\ GI_{36}^{0.873}$
12	$SI = 1.3 + 2.79\ GI_{12}^{0.508}$	37	$SI = 1.3 + 0.718\ GI_{37}^{0.884}$
13	$SI = 1.3 + 2.51\ GI_{13}^{0.536}$	38	$SI = 1.3 + 0.694\ GI_{38}^{0.894}$
14	$SI = 1.3 + 2.30\ GI_{14}^{0.560}$	39	$SI = 1.3 + 0.673\ GI_{39}^{0.903}$
15	$SI = 1.3 + 2.13\ GI_{15}^{0.579}$	40	$SI = 1.3 + 0.655\ GI_{40}^{0.911}$
16	$SI = 1.3 + 1.97\ GI_{16}^{0.599}$	41	$SI = 1.3 + 0.634\ GI_{41}^{0.921}$
17	$SI = 1.3 + 1.83\ GI_{17}^{0.620}$	42	$SI = 1.3 + 0.608\ GI_{42}^{0.933}$
18	$SI = 1.3 + 1.69\ GI_{18}^{0.641}$	43	$SI = 1.3 + 0.593\ GI_{43}^{0.941}$
19	$SI = 1.3 + 1.60\ GI_{19}^{0.656}$	44	$SI = 1.3 + 0.580\ GI_{44}^{0.948}$
20	$SI = 1.3 + 1.52\ GI_{20}^{0.670}$	45	$SI = 1.3 + 0.566\ GI_{45}^{0.957}$
21	$SI = 1.3 + 1.44\ GI_{21}^{0.684}$	46	$SI = 1.3 + 0.548\ GI_{46}^{0.967}$
22	$SI = 1.3 + 1.36\ GI_{22}^{0.700}$	47	$SI = 1.3 + 0.531\ GI_{47}^{0.977}$
23	$SI = 1.3 + 1.30\ GI_{23}^{0.712}$	48	$SI = 1.3 + 0.517\ GI_{48}^{0.986}$
24	$SI = 1.3 + 1.25\ GI_{24}^{0.724}$	49	$SI = 1.3 + 0.506\ GI_{49}^{0.993}$
25	$SI = 1.3 + 1.19\ GI_{25}^{0.736}$	50	$SI = 1.3 + 0.496\ GI_{50}^{1.00}$

where: SI = estimated site index (m at breast height age 50), and
GI = growth intercept (cm/year).

Site Index Table for Western Larch

bh ring count	Tree Height (m)													
	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	Site Index (m)													
2	20	26	29	32	34	36	38	39	40	–	–	–	–	–
4	16	21	24	27	29	31	33	34	36	37	38	39	40	–
6	13	18	21	24	26	28	30	31	32	34	35	36	37	38
8	11	16	19	21	24	25	27	29	30	32	33	34	35	36
10	10	14	17	19	21	23	25	27	28	29	31	32	33	34
12	8	12	15	18	20	22	23	25	26	28	29	31	32	33
14	7	11	14	16	18	20	22	23	25	26	28	29	30	32
16	6	10	12	15	17	18	20	22	23	25	26	28	29	30
18	5	9	11	13	15	17	19	20	22	23	25	26	28	29
20	5	8	10	12	14	16	18	19	21	22	23	25	26	27
22	–	7	9	11	13	15	16	18	19	21	22	24	25	26
24	–	7	9	10	12	14	15	17	18	20	21	22	24	25
26	–	6	8	10	11	13	15	16	17	19	20	21	23	24
28	–	6	7	9	11	12	14	15	16	18	19	20	22	23
30	–	5	7	9	10	11	13	14	16	17	18	19	21	22
32	–	5	6	8	9	11	12	14	15	16	17	19	20	21
34	–	5	6	8	9	10	12	13	14	15	17	18	19	20
36	–	–	6	7	8	10	11	12	13	15	16	17	18	19
38	–	–	5	7	8	9	10	12	13	14	15	16	17	19
40	–	–	5	6	8	9	10	11	12	13	15	16	17	18
42	–	–	5	6	7	8	9	11	12	13	14	15	16	17
44	–	–	5	6	7	8	9	10	11	12	13	14	16	17
46	–	–	–	5	7	8	9	10	11	12	13	14	15	16
48	–	–	–	5	6	7	8	9	10	11	12	13	14	16
50	–	–	–	5	6	7	8	9	10	11	12	13	14	15

bh - breast height = 1.3 m

(continued)

Tree Height (m)														bh ring
16	17	18	19	20	21	22	23	24	25	26	27	28	29	count
Site Index (m)														
–	–	–	–	–	–	–	–	–	–	–	–	–	–	2
–	–	–	–	–	–	–	–	–	–	–	–	–	–	4
39	40	–	–	–	–	–	–	–	–	–	–	–	–	6
37	38	39	40	–	–	–	–	–	–	–	–	–	–	8
35	36	37	38	39	40	–	–	–	–	–	–	–	–	10
34	35	36	37	38	39	40	–	–	–	–	–	–	–	12
33	34	35	36	38	39	40	–	–	–	–	–	–	–	14
31	33	34	35	36	37	38	39	40	–	–	–	–	–	16
30	31	33	34	35	36	37	38	39	–	–	–	–	–	18
29	30	31	32	34	35	36	37	38	39	40	–	–	–	20
27	29	30	31	32	33	34	36	37	38	39	40	–	–	22
26	27	29	30	31	32	33	34	35	36	38	39	40	–	24
25	26	27	29	30	31	32	33	34	35	36	37	38	39	26
24	25	26	28	29	30	31	32	33	34	35	36	37	38	28
23	24	25	27	28	29	30	31	32	33	34	35	36	37	30
22	23	24	26	27	28	29	30	31	32	33	34	35	36	32
21	22	24	25	26	27	28	29	30	31	32	33	34	35	34
20	22	23	24	25	26	27	28	29	30	31	33	34	35	36
20	21	22	23	24	25	26	27	28	30	31	32	33	34	38
19	20	21	22	23	24	25	27	28	29	30	31	32	33	40
18	19	20	21	23	24	25	26	27	28	29	30	31	32	42
18	19	20	21	22	23	24	25	26	27	28	29	30	31	44
17	18	19	20	21	22	23	24	25	26	27	28	29	30	46
17	18	19	20	21	22	23	24	25	26	27	28	29	30	48
16	17	18	19	20	21	22	23	24	25	26	27	28	29	50

Options:

1. The growth intercept can also be determined by calculating the average annual height growth from the annual branch whorls above breast height. This method is useful when the stem is not suitable for growth intercept measurements (e.g., when the trees have top damage) and for research applications.

Notes:

The growth intercept table (preceding) eliminates the need to calculate the growth intercept. To use the table, first measure the total height of a top height tree and count the number of annual growth rings at its breast height. Find the row corresponding to the ring count and the column most closely corresponding to the tree height. The number at the intersection of this row and column is the approximate site index.

The model formulation provides better resolution than the table. For those wanting this resolution, the growth intercept is calculated by subtracting 1.3 from the tree height (in m), dividing by the number of years of growth above breast height (ring count - 0.5), and then multiplying by 100 to convert metres into centimetres. The site index is first calculated for each tree in the plot from its growth intercept and the model corresponding to age = ring count. The site indices are then averaged to get a site index for the plot.

The growth intercept models were developed from 99 stem analysis plots. Plots ranged in site index from about 10 to 27 m, and the growth intercepts ranged from about 14 to 105 cm. The models can be used throughout the interior of British Columbia.